

REMARKS

In response to the Office Action mailed September 17, 2004, Applicant amends his application and requests reconsideration. Claims 1-8 are cancelled in this Amendment and claims 13-21 are added so that claims 9-21 are now pending.

PRELIMINARY AMENDMENT

A Preliminary Amendment was filed simultaneously with this patent application. The Preliminary Amendment included amendments to the specification, two replacement drawing sheets, and amendments to the claims. All of these parts of the Preliminary Amendment appear in the image file wrapper (IFW) of the patent application. However, it may be difficult to find some of these parts of the Preliminary Amendment since the Patent Office enters as separate documents each of the parts of the Preliminary Amendment. It is apparent, as discussed below, that the Examiner did not consider the claims as amended in the Preliminary Amendment. Therefore, it is not apparent whether the Examiner, in approving the drawings, considered the replacement drawing sheets submitted with the Preliminary Amendment. For that reason, it is requested that the Examiner now take up the Preliminary Amendment and consider the replacement drawing sheets, making an affirmative statement, even if those documents have been previously considered, that the Amendment has been entered. All of the claim amendments that appear here are with respect to the claims as they appeared in the Preliminary Amendment, not the claims as examined.

THE INVENTION

The invention concerns a metal oxide semiconductor device, namely a transistor. As filed, the application included independent claims 1 and 9. Claim 1, now cancelled, described a structure of a metal oxide semiconductor transistor including a source and drain, a gate disposed between the source and drain, and a control gate disposed between the gate and either the source or the drain. Of course, the patent application discloses structures in which there are two such control electrodes, one on each side of the gate electrode. Claim 9 is directed to a structure having some similarities to the transistor of claim 1 but having a particular characteristic regarding the threshold voltage. The threshold voltage of the transistor varies along the width of the gate. As well known to those of skill in the art, a gate electrode has a length, a dimension that is measured along a direction extending between the source and the drain that are separated by the gate

electrode. In general, gate electrodes may be rectangular and the gate length is not the longer dimension of the conventional rectangular gate electrode shape, but the shorter dimension that extends along a line connecting the source and drain. Likewise, the gate width is a direction perpendicular to the gate length.

In amended claims 9-12 and in the new claims 13-21, reference is made to a device area that includes longitudinal and transverse directions. The longitudinal direction is defined to extend in the direction of the gate length and the transverse direction extends in the direction of the gate width.

New claim 13 is a dependent claim that is supported by the embodiment of the invention illustrated, for example, in Figures 11 and 12. New claims 14-21 are derived from claims that were presented for examination. Correlation may be established between claims 1 and 14 and claims 14-21 and original claims 2-8.

PRIOR ART REJECTIONS

Claims 10 and 11 were stated to be allowable if rewritten in independent form. Claims 10 and 11 may be described with respect to the amendment of claim 9 discussed below.

Claims 9 and 12 were rejected as obvious over Fukase (U.S. Patent 5,796,139) in view of Kachelmeier (Published U.S. Patent Application 2002/0145166). This rejection is respectfully traversed.

In this Amendment claim 9 is amended for clarity. Amended claim 9 describes, more clearly, that the first control channel region, which is located within the device area, has a voltage threshold that gradually changes along the transverse direction of the device area, i.e., along the width of the gate. As previously discussed, the width of the gate electrode is measured along a direction transverse to a line joining the source and the drain. In amended claim 9, the arrangement of the device area is explained with regard to the locations of the source and drain regions, the gate layer, and the first control channel region relative to the orientation of the device area. This amendment is entirely consistent with the patent application disclosure with regard to Figures 9-19. Claim 10 has been simplified and claims 11 and 12 have been conformed to the amendment of claim 9. New claim 13 is supported by the embodiments of Figures 11, 16, and 18 of the patent application.

Even if it is assumed that Fukase describes the structure of all of claim 9 with the exception of the final paragraph, Kachelmeier fails to describe the structure of the final paragraph. In other words, *prima facie* obviousness has not been demonstrated with

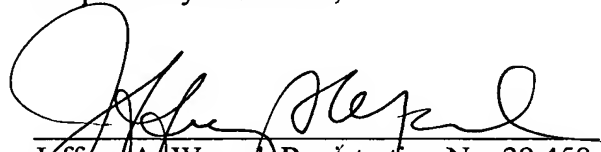
respect to any of claims 9-12 because it has not been demonstrated that all of the elements of claim 9 are known in the prior art.

Kachelmeier certainly describes varying the threshold voltage across a gate electrode with respect to a gate length. For example, in Figure 2 of Kachelmeier, to which the Examiner directed attention, the insulating film 7 has a variable thickness along the gate length direction, resulting in a variation of the threshold voltage along that direction. However, in the invention of the present patent application as described with respect to claims 9-19, the direction along which the voltage threshold changes is along the gate width, not along the gate length. Thus, the proposed modification of Fukase with Kachelmeier could still not produce the invention as defined by claim 9 or its dependent claims 10-13.

For the foregoing reasons, the rejection of the examined claims that are still pending has been overcome. The newly submitted claims are clearly patentable over the prior art applied in rejecting the examined claims. There is no plan view of the structure in Fukase from which one could even make a determination as to whether the structures of new claims 14-21 could be described or suggested by Fukase. The cross-sectional figures in Fukase, particularly Figure 3B, fail to disclose the extent of any gate electrode or any control gate electrode relative to a device area, and the existence of a first gap as described in claim 14. Further, there is no doped region within the substrate of Fukase that could correspond to the diffusion region of claim 14. New claims 14-21 are, therefore, allowable over the art of record.

Reconsideration and allowance of all of claims 1-21 are earnestly solicited.

Respectfully submitted,


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In re Appln. of YUTAKA ARIMA
Application No. 10/765,203